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- (71) Applicants (for all designated States except US): **THE GENERAL HOSPITAL CORPORATION** [US/US]; 55 Fruit Street, Boston, MA 02114 (US). **GPB SCIENTIFIC LLC** [US/US]; One Kendall Square, Cambridge, MA 02139 (US).
- (72) Inventors; and
(75) Inventors/Applicants (for US only): **TONER, Mehmet** [TR/US]; 100 Pilgrim Road, Wellesley, MA 02481 (US). **TRUSKEY, George** [US/US]; 921 Monmouth Avenue, Durham, NC 27701 (US). **KAPUR, Ravi** [US/US]; 292 Morton Street, Stoughton, MA 02072 (US).
- (74) Agents: **CLARK, Paul, T. et al.**; Clark & Elbing LLP, 101 Federal Street, Boston, MA 02110 (US).
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(54) Title: MICROFLUIDIC DEVICE FOR CELL SEPARATION AND USES THEREOF

(57) Abstract: The invention features methods for separating cells from a sample (e.g., separating fetal red blood cells from maternal blood). The method begins with the introduction of a sample including cells into one or more microfluidic channels. In one embodiment, the device includes at least two processing steps. For example, a mixture of cells is introduced into a microfluidic channel that selectively allows the passage of a desired type of cell, and the population of cells enriched in the desired type is then introduced into a second microfluidic channel that allows the passage of the desired cell to produce a population of cells further enriched in the desired type. The selection of cells is based on a property of the cells in the mixture, for example, size, shape, deformability, surface characteristics (e.g., cell surface receptors or antigens and membrane permeability), or intracellular properties (e.g., expression of a particular enzyme).